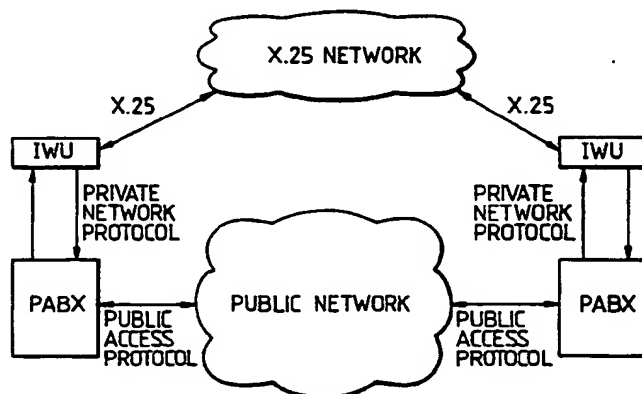


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(54) Title: **SPEECH/SIGNALLING OVERLAY**

(57) Abstract

Where private networks (PABX) are required to be connected together this can be carried out by separation of the signalling and transmission network bearers and using the public network. An interworking unit is used to provide the necessary protocol changes between the private (PABX) and public networks. The signalling can be sent by services such as X.25 packet switching or using the features of an Intelligent Network.

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SPEECH/SIGNALLING OVERLAY

The present invention relates to the provision of interconnections between private networks using the facilities of public networks.

The development of private networks is moving forward rapidly. In highly developed countries (such as the UK), dedicated private networks are now commonplace, linking together the relatively large sites of a particular business.

In the UK, the next development is towards the "Integrated Scenario" where the public network co-operates with the private network signalling protocols to provide "Virtual Private Circuits" with channels in a 2048kbit/sec bearer switched to different locations based upon the signalling information.

Other countries have not been so liberal with the use of dedicated private circuits and networks have not evolved in the same way and the public network operator sees less benefit in co-operating with the private networks.

In these countries, an alternative strategy is developing known as the "Overlay Scenario". In this case, the PABX takes on the responsibility for establishing the connections across the public network based upon the routing information and, because the public network is not capable of supporting the full range of signalling required to provide the private network services, signalling for the services takes place directly between the PABXs across some other

network.

To achieve this with existing PABXs with their dedicated protocols would require a significant change to the signalling protocols and call establishment logic.

An alternative approach is to provide an "Overlay Scenario Interworking Unit". The purpose of this unit would be to "fool" the PBX into thinking that it was permanently connected to dedicated private circuits, whilst dynamically establishing the connections across the public network as they were required.

According to the present invention there is provided a method of providing system and network independent dedicated private circuit telecommunications functionality using separate signalling and transmission network bearers.

There is further provided a private telecommunications network including an interworking unit for use in interconnecting network to a further private network via a public network using separate signalling and transmission network bearers, the interworking unit comprising an encoder to take the information from the outgoing user side and encode it so that the transmission and signalling information can be carried across separate network and signalling bearers to be decoded at the further private network and a decoder to take incoming transmission and signalling information and using information provided by an encoder correlate the transmission bearers and the signalling information at the interface on the incoming user side.

The present invention will now be described, by way of example, with reference to the accompanying drawings, in which :-

Figure 1 shows a diagrammatic view of an interconnection between two private networks via a public network using the present invention;

Figure 2 shows the use of the present invention in conjunction with an intelligent network;

Figure 3 shows a flow chart of the call set up procedure using an intelligent network as shown in Figure 2;

Figure 4 shows a diagrammatic representation of the use of the present invention in international communications;

Figure 5 shows a diagrammatic view of the functioning of an Interworking Unit in accordance with the present invention.

There are a number of options as to how an interworking unit may be achieved, but Figure 1 shows one possibility.

The interworking unit (IWU) sits alongside the PABX, providing a virtual network to the PABX. All private network calls route through the IWU which uses a database to translate the incoming Private network number to a public network number and establishes an outgoing call to that public network address across another private interface.

This is routed back through the PABX so that the public network interfaces that are required on the PABX can be used, simplifying the development of the IWU. The address provided on the secondary call identifies the call, but need not route the call to the final extension across the public network.

The signalling necessary to establish the final part of the call on the other side of the network is sent through the overlay network, the suggestion in this case is that the signalling should be X.25 and calls established within the X.25 network as required to support the private network.

Because the IWU is connected only to a single PABX, the signalling between the IWU and the PABX is a single protocol. Where different protocols are used on the originating and terminating PABXs, protocol conversion will be required.

This IWU can be seen as the first of a family of products:-

1. Simple DPNSS - DPNSS across the network;
2. Simple CorNet-N - CorNet-N across the network;
3. CorNet-N - DPNSS Interworking across the network;
4. CorNet-N or DPNSS - QSIG across the network;
5. Speech compression allowing multiple connections to be made through one bearer across the network;
6. Dynamic establishment of the signalling bearer to cost reduce the calls;

Other unrelated functions may also be able to be added to

the IWU in the future.

Using X.25 as the protocol between the networks means that all existing public networks can be accessed, all that has to be managed is the relationship between the calling and called sides of the connection across the network to ensure that security is maintained.

Initially, it can be expected that the IWU will manage the virtual network database, but there is no reason why other databases should not be used.

This example has several benefits:-

1. It builds upon strengths in networking;
2. It is not "core product" in that it is an external add-on to any product;

The solution is not "the cheapest" for the customer in that it requires him to have additional private network interfaces and generates additional traffic within the gateway PABXs. However, if it proves successful, the logic could be incorporated into the core product in the future.

In Figure 2 is shown the situation where the signalling is routed via the Service Control Point (SCP) of an Intelligent Network. This enables access to services which may be provided by the Intelligent Network, one or more PBX's being connected to a gateway PBX for the network.

Figure 3 shows the flow diagram for the establishment of a call using an Intelligent Network. The abbreviations used are :-

SETUP DN	- Setup Dialed Number
REQ TR	- Request Transmission
RES NDN	- Reserve Network Dialling Number
SETUP IDN	- Setup Incoming Dialling Number
EST AP-AP DIALOG	- Establish Application-Application Dialog
CALL INF	- Call Information

Figure 4 shows the use of the invention including the use of Intelligent Networks, SYS X being the protocol used in the UK and EWSD the protocol used in USA and Germany.

Figure 5 shows the construction of an Interworking Unit (IWU) for use with the invention.

A prime function of the IWU is to convert the signalling protocols between the originating PBX and the terminating PBX based upon information held within the database. The following conversions are needed:

1. Conversion between the PBX to IWU protocol and the Network Access protocol;
2. Conversion between the Network Access protocol and the IWU to PBX protocol;
3. Conversion between the PBX to IWU protocol and the IWU to IWU protocol;
4. Conversion between the IWU to IWU protocol and the IWU to PBX protocol.

The PBX to IWU and IWU to PBX protocols are a choice from CorNet-N, DPNSS, QSIG (or the ISO equivalent), but other protocols can be accommodated within the concept.

Within the IWU the follow functions are carried out:-

The Encoder Function takes the information from the outgoing user side and encodes it so that the transmission and signalling can be carried across separate networks and decoded;

The Decoder Function takes incoming independent transmission and signalling information and, using information provided by the Encoder correlates the transmission bearers and the signalling information at the interface on the incoming user side;

The Splitter separates the signalling and transmission

paths at the incoming user side;

The Compressor compresses the information from a number of user side transmission bearers onto a single network side transmission channel if appropriate;

The Router takes the address information in the User Side signalling and generates the Network Side address to be used in the transmission network by examining database information;

The Outgoing Correlator adds unambiguous information to the Network Sidesignalling so that the user side signalling can be identified at the destination;

The Outgoing Network Interface Originates the Network Side and adds dialing functions to address the destination IWU and switches the bearers from the compressor to free network bearers;

The Outgoing Signalling Interface connects the Network Side signalling to the network for the destination IWU;

The Incoming Network Interface Terminates the Network side and flags the source to the incoming correlator;

The Incoming Signalling Interface terminates the signalling network and provides the information to the incoming correlator and the combination processor;

The Incoming Correlator identifies the signalling information and incoming transmission bearer and links them together;

The Expander extracts the informaton from the network side transmission bearer and generates a number of user side

transmission bearers if appropriate and identifies the information to the Incoming Correlator;

The Combination processor takes the incoming transmission connection from the Expander Interface and combines it with the correlated signalling from the incoming signalling interface;

The User Side Addresser takes the address information from the Combination Processor to provide the incoming user address.

CLAIMS

1. A method of providing system and network independent dedicated private circuit telecommunications functionality using separate signalling and transmission network bearers.
2. A method as claimed in Claim 1 further including the use of a data base to determine the routing across intervening switched and fixed networks to provide private network capabilities.
3. A method as claimed in Claim 1 or 2, further including the compression of the user information before transmission.
4. A method as claimed in Claim 1, 2 or 3 wherein the signalling network bearer is part of an X.25 packet switching network.
5. A private telecommunications network including an interworking unit for use in interconnecting the network to a further private network via a public network using separate signalling and transmission network bearers, the interworking unit comprising an encoder to take the information from the outgoing user side and encode it so that the transmission and signalling information can be carried across separate network and signalling bearers to be decoded at the further private network and a decoder to take incoming transmission and signalling information and using information provided by an encoder correlate the transmission bearers and the signalling information at the interface on the incoming user side.
6. A network as claimed in Claim 5, the encoder comprising a router to take the address information in the user side signalling and generate therefrom using information contained within a database a network side address to be used in the transmission network.
7. A network as claimed in Claim 6, the decoder comprising a correlator to add unambiguous information to the network side signalling so that the user side signalling can be identified at the destination.
8. A network as claimed in Claim 5, 6 or 7 the encoder further comprising a compressor and the decoder further comprising an expander.

Fig.1.

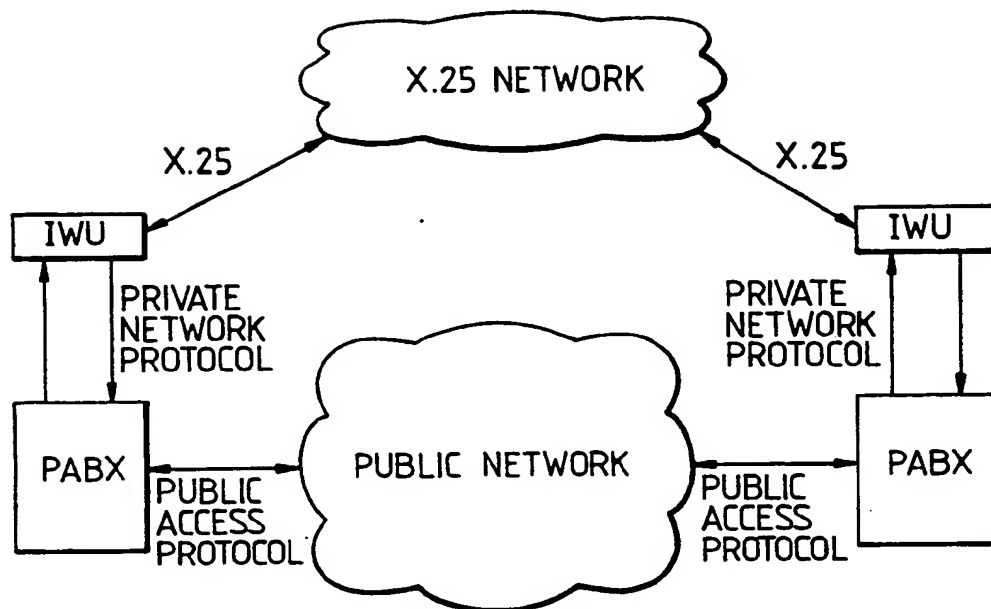


Fig.2.

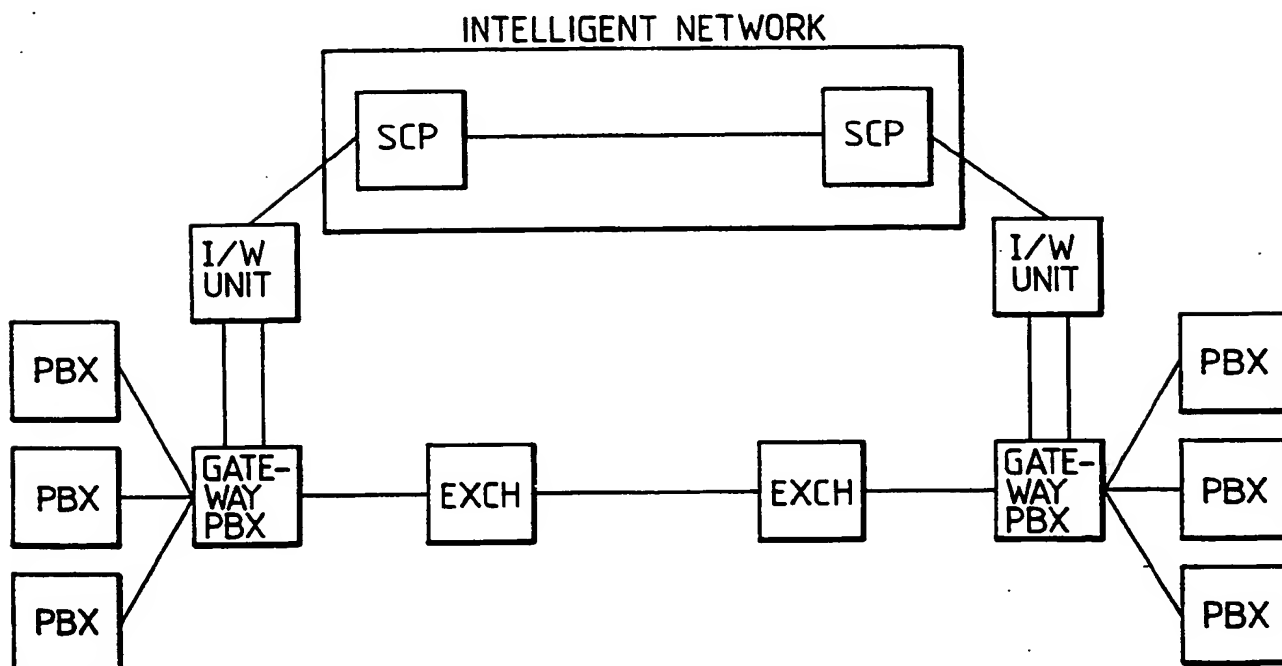
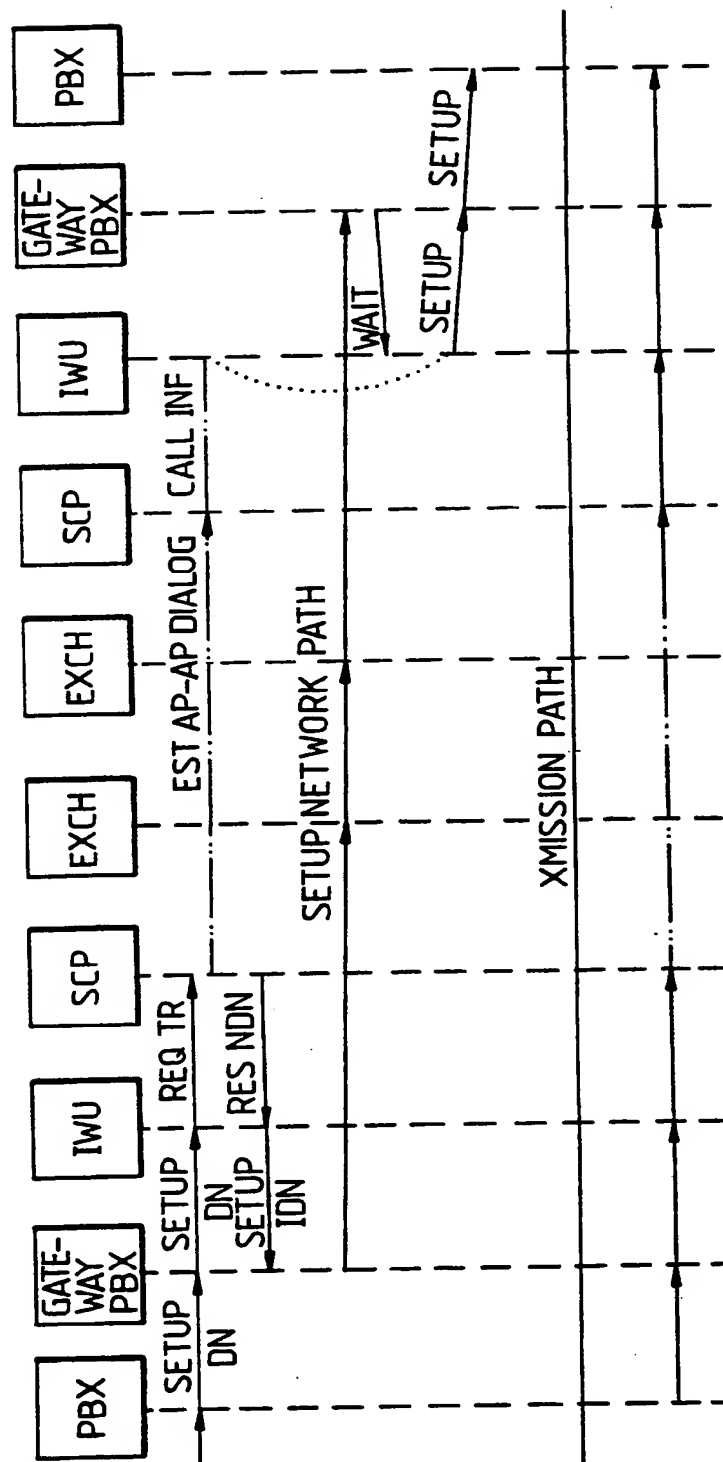


Fig. 3.



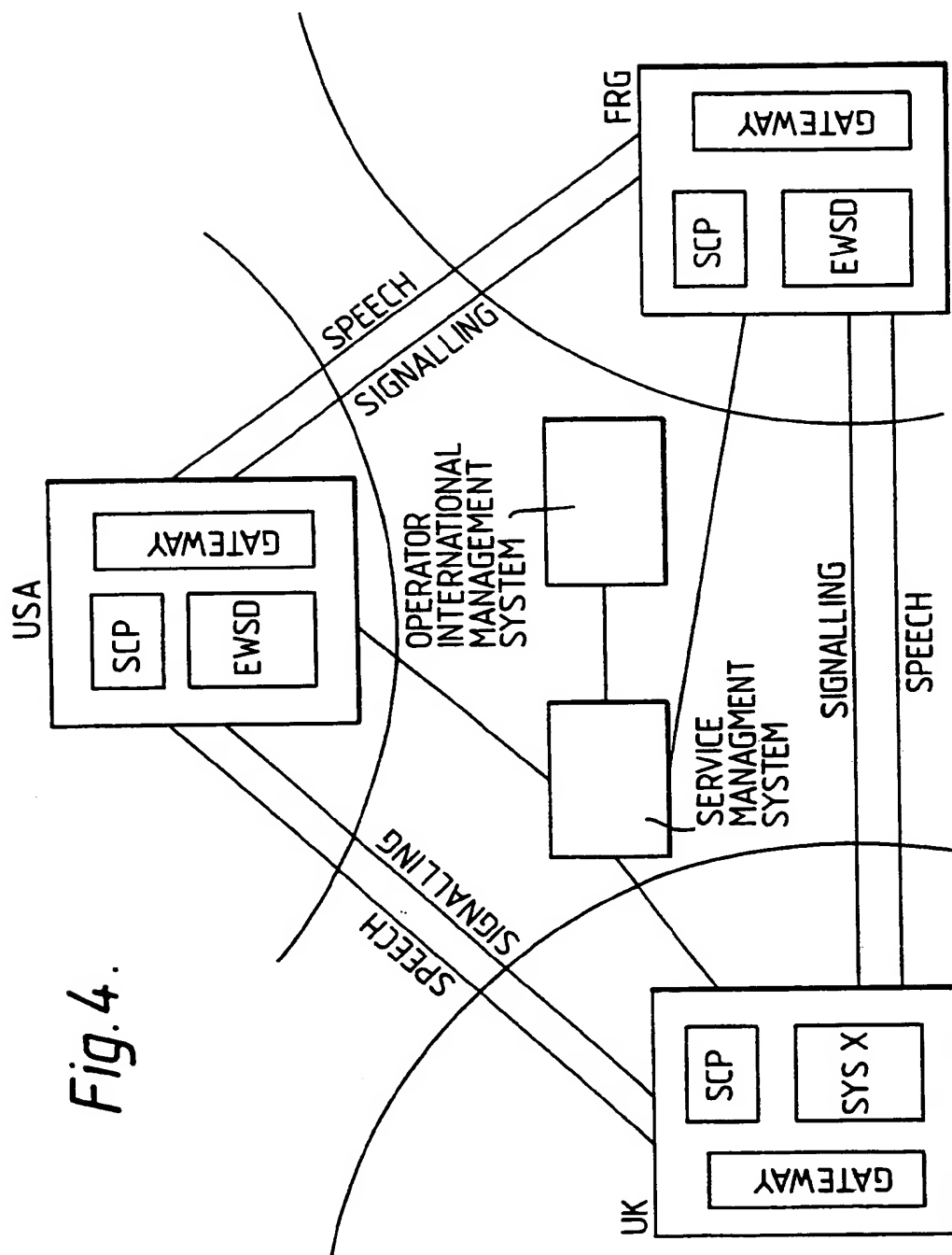
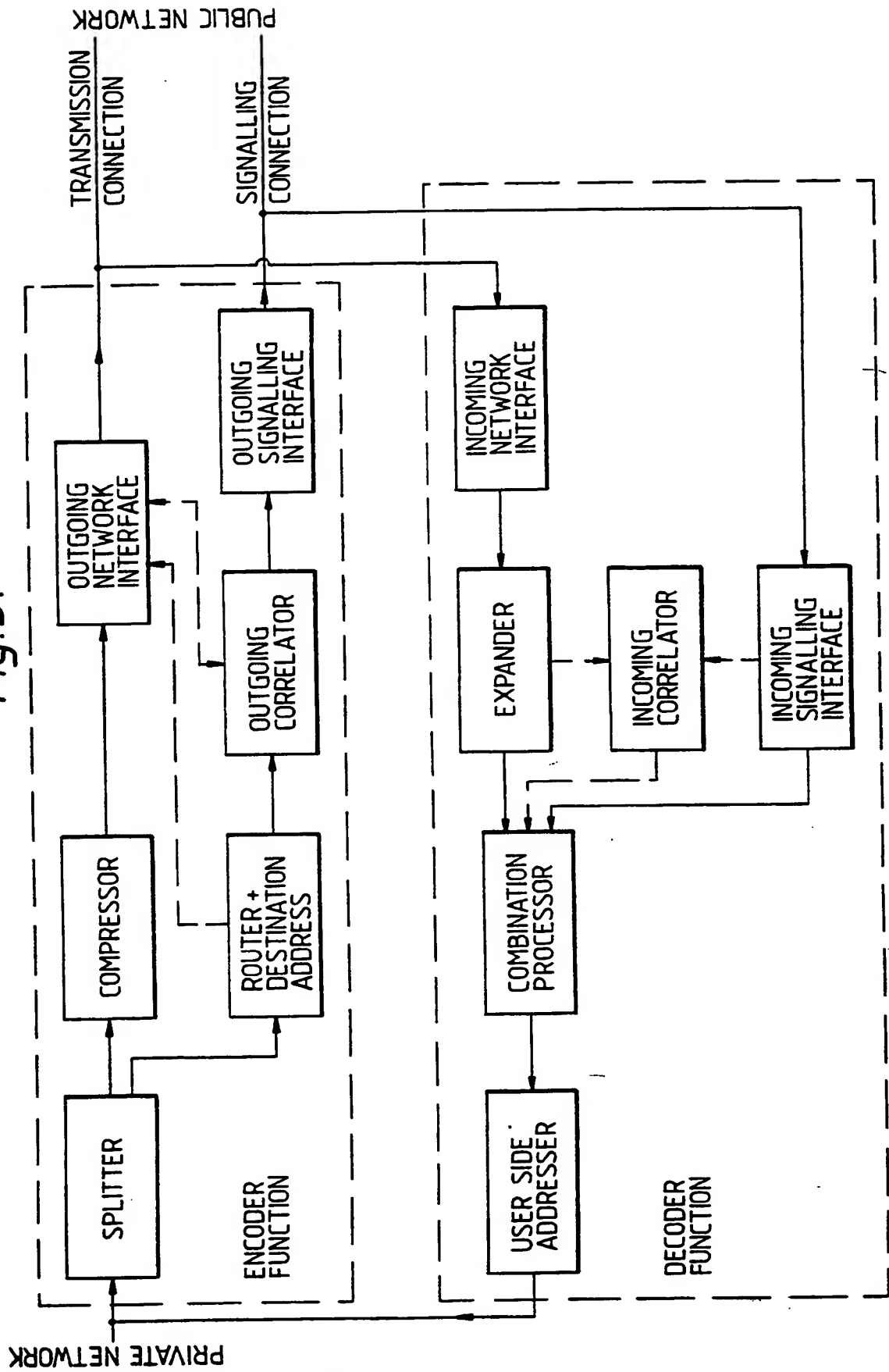


Fig.4.

Fig. 5.



INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 93/00153

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁴ According to International Patent Classification (IPC) or to both National Classification and IPC IPC ⁵ : H 04 M 7/00, H 04 L 12/46																							
II. FIELDS SEARCHED <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black; margin: 5px 0;">Minimum Documentation Searched ⁷</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; border-bottom: 1px solid black; padding: 5px;">Classification System </td> <td style="border-bottom: 1px solid black; padding: 5px;">Classification Symbols</td> </tr> <tr> <td style="padding: 5px;">IPC⁵ </td> <td style="padding: 5px;">H 04 M, H 04 L, H 04 Q</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black; margin: 5px 0;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁶</div>			Classification System	Classification Symbols	IPC ⁵	H 04 M, H 04 L, H 04 Q																	
Classification System	Classification Symbols																						
IPC ⁵	H 04 M, H 04 L, H 04 Q																						
III. DOCUMENTS CONSIDERED TO BE RELEVANT ³ <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; padding: 5px;">Category ⁸</th> <th style="width: 70%; padding: 5px;">Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 20%; padding: 5px;">Relevant to Claim No. ¹³</th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">US, A, 4 924 500 (LEWIS et al.) 08 May 1990 (08.05.90), abstract; column 2, line 51 - column 3, line 55; fig. 1,2.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="text-align: center; vertical-align: top; padding: 5px;">--</td> <td style="text-align: center; vertical-align: top; padding: 5px;">5</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">GB, A, 2 125 252 (STANDARD TELEPHONES AND CABLES) 29 February 1984 (29.02.84), abstract; page 1, lines 3-38; page 1, lines 69-110; fig.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">5</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="text-align: center; vertical-align: top; padding: 5px;">--</td> <td style="text-align: center; vertical-align: top; padding: 5px;">5</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">GB, A, 2 174 269 (STC) 29 October 1986 (29.10.86), abstract; fig.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">5</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">TELEFON REPORT, vol. 13, no. 2, issued June 1977,</td> <td style="text-align: center; vertical-align: top; padding: 5px;">5</td> </tr> </table>			Category ⁸	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X	US, A, 4 924 500 (LEWIS et al.) 08 May 1990 (08.05.90), abstract; column 2, line 51 - column 3, line 55; fig. 1,2.	1	A	--	5	A	GB, A, 2 125 252 (STANDARD TELEPHONES AND CABLES) 29 February 1984 (29.02.84), abstract; page 1, lines 3-38; page 1, lines 69-110; fig.	5	A	--	5	A	GB, A, 2 174 269 (STC) 29 October 1986 (29.10.86), abstract; fig.	5	A	TELEFON REPORT, vol. 13, no. 2, issued June 1977,	5
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A	TELEFON REPORT, vol. 13, no. 2, issued June 1977,	5																					
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>¹⁴ Special categories of cited documents: ¹⁵</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"Z" document member of the same patent family</p> </div> </div>																							
IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;">Date of the Actual Completion of the International Search</td> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;">Date of Mailing of this International Search Report</td> </tr> <tr> <td style="text-align: center; padding: 5px;">27 April 1993</td> <td style="text-align: center; padding: 5px;">12 MAY 1993</td> </tr> <tr> <td style="border-bottom: 1px solid black; padding: 5px;">International Searching Authority</td> <td style="border-bottom: 1px solid black; padding: 5px;">Signature of Authorized Officer</td> </tr> <tr> <td style="text-align: center; padding: 5px;">EUROPEAN PATENT OFFICE</td> <td style="text-align: center; padding: 5px;">HAJOS e.h.</td> </tr> </table>			Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	27 April 1993	12 MAY 1993	International Searching Authority	Signature of Authorized Officer	EUROPEAN PATENT OFFICE	HAJOS e.h.													
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EUROPEAN PATENT OFFICE	HAJOS e.h.																						

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages	Relevant to Claim No.
	<p>Siemens Aktiengesellschaft Berlin und München H. JÄGER et al. "Verbindungs- verkehr zwischen Fernsprech- -Nebenstellenanlagen - Netzplanung, Numerierung und Übertragungstechnik", pages 55-60 page 55, right-hand column, line 8 - page 56, left-hand column, line 8. -----</p>	

ANHANG

zum internationalen Recherchen-
bericht über die internationale
Patentanmeldung Nr.

ANNEX

to the International Search
Report to the International Patent
Application No.

ANNEXE

au rapport de recherche inter-
national relatif à la demande de brevet
international n°

PCT/GB93/00153 SAE 69446

In diesem Anhang sind die Mitglieder
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nannten internationalen Recherchenbericht
angeführten Patentedokumente angegeben.
Diese Angaben dienen nur zur Unter-
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This Annex lists the patent family
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US A 4924500	08-05-90	AU A1 53793/90 AU B2 620240 CA A1 1312394 EP A2 398183 EP A3 398183 JP A2 2311065 NO A0 901936 NO A 901936	22-11-90 13-02-92 05-01-93 22-11-90 23-12-92 26-12-90 30-04-90 19-11-90
GB A 2125252		GB A1 2125252 GB B2 2125252	29-02-84 29-08-85
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Fig. 1.

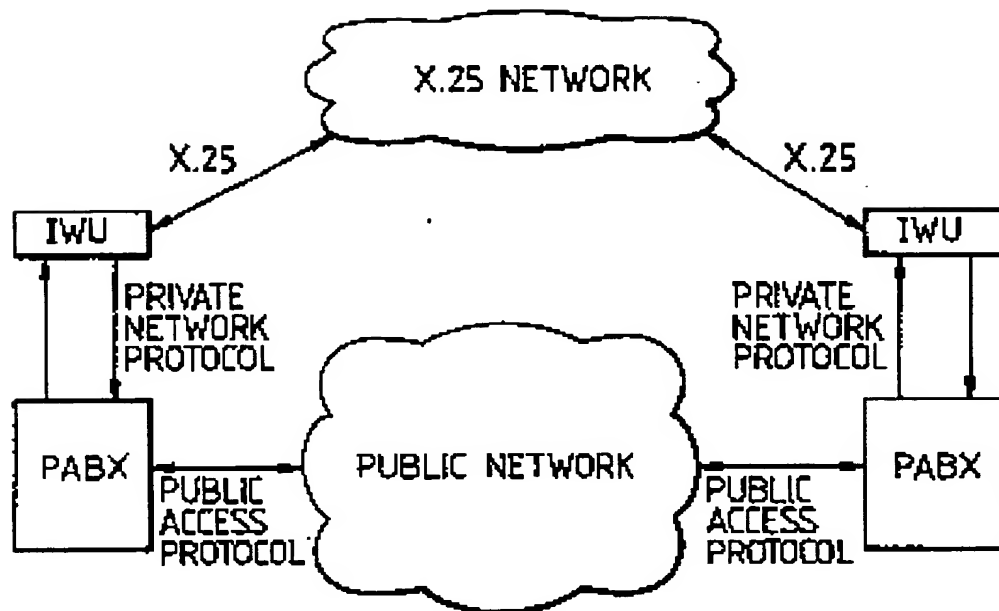


Fig. 2.

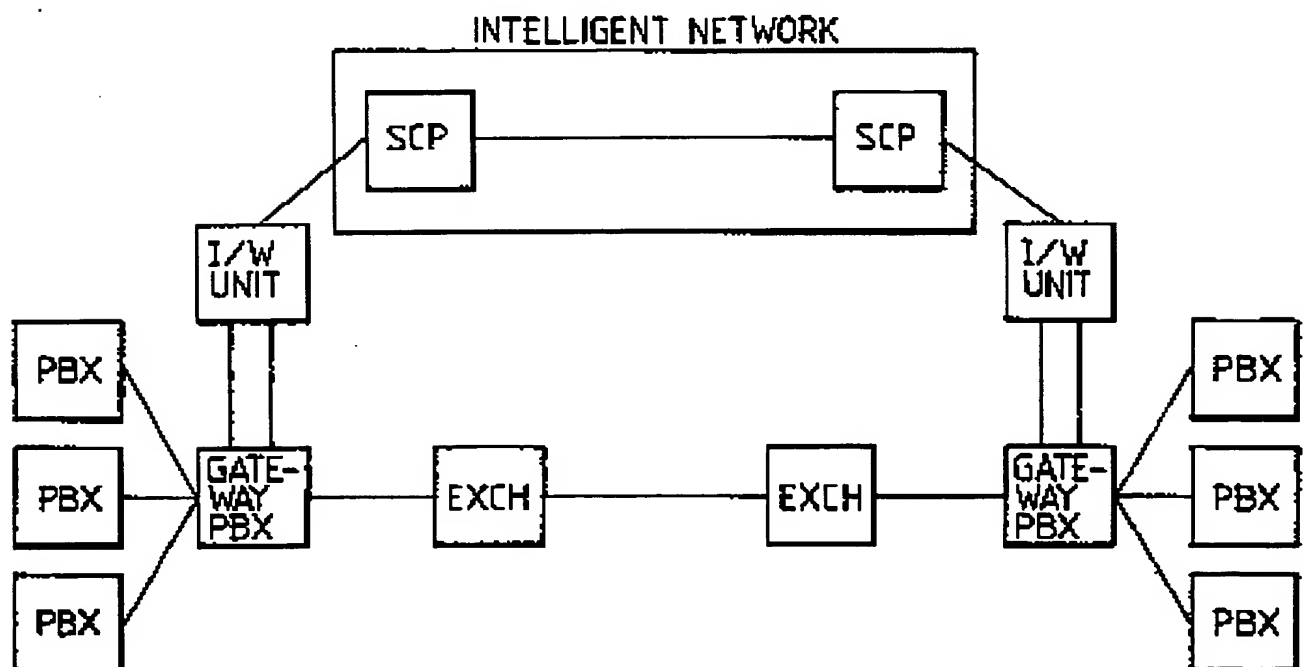
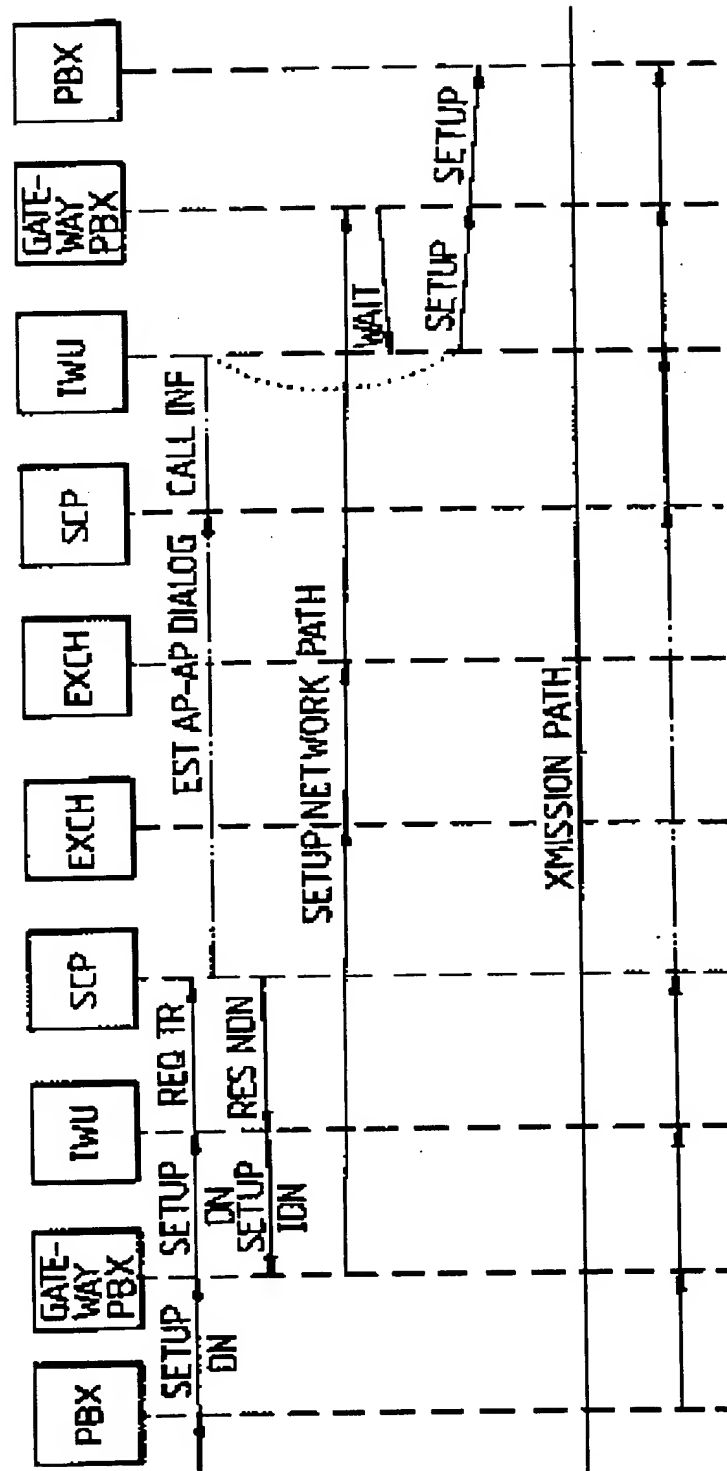
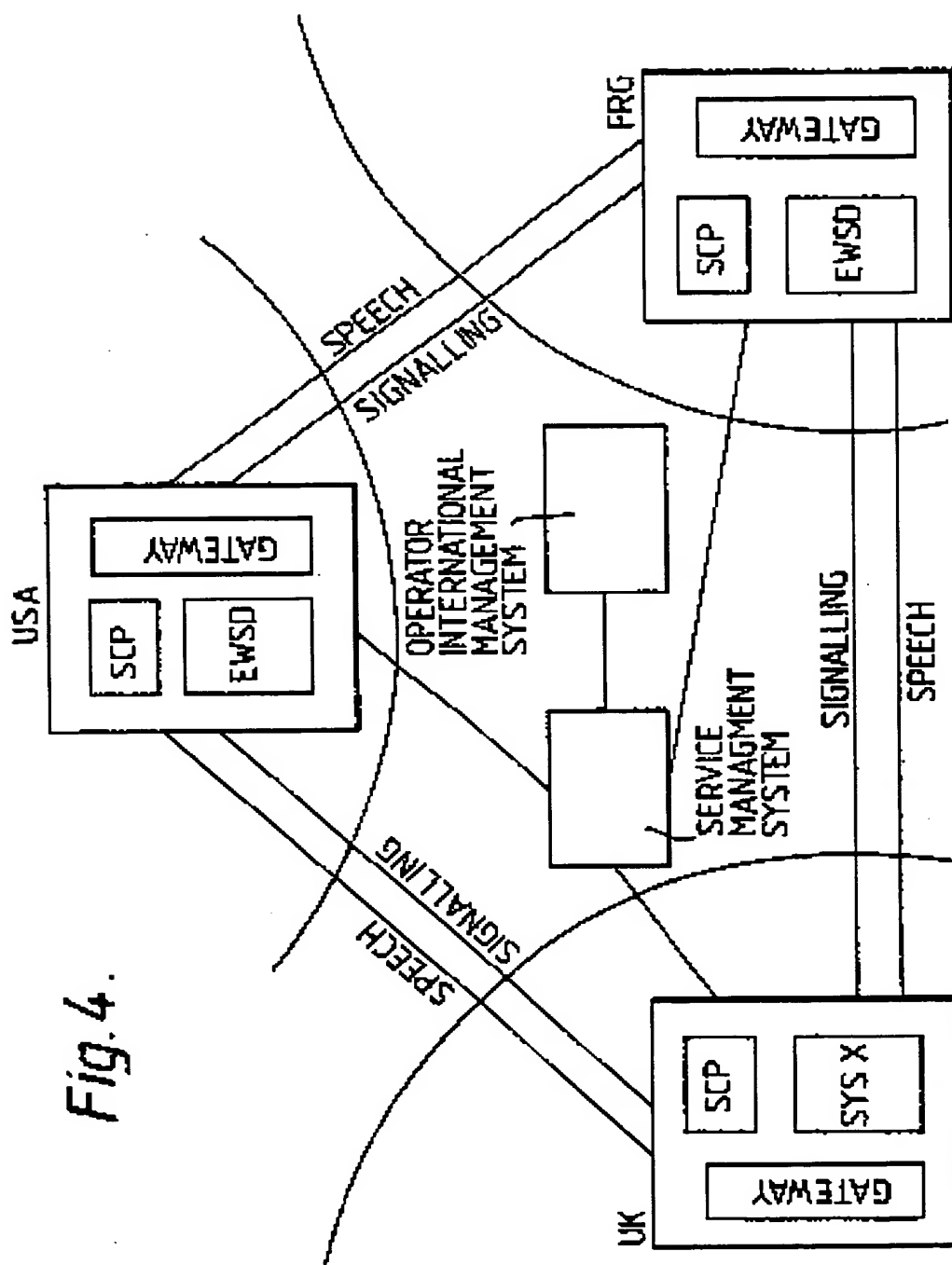


Fig.3.





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Fig. 5.

